Appendix A

This application claims ~~priority on~~ the benefit of International Patent Application No. PCT/US00/14139, filed May 23, 2000, which claims the benefit of U.S. Provisional Patent Application No. 60/142,587 filed July 7, 1999.

1. In a voice coil actuator ~~(100, 130, 160, 170)~~ of the type comprising a coil ~~(108, 118, 128, 138, 168, 178)~~, an armature ~~(106, 136, 166, 176)~~, a housing ~~(102, 132, 162, 172)~~ and a magnet ~~(104, 134, 144, 154, 164, 174)~~, wherein the armature ~~(106, 136, 166, 176)~~ is disposed at least partially within the housing ~~(102, 132, 162, 172)~~ and movable relative thereto and the coil ~~(108, 118, 128, 138, 168, 178)~~ and the magnet ~~(104, 134, 144, 154, 164, 174)~~ are disposed relative to each other so as to induce movement of the armature ~~(106, 136, 166, 176)~~ relative to the housing ~~(102, 132, 162, 172)~~ when the coil ~~(108, 118, 128, 138, 168, 178)~~ is energized by an electrical current, the improvement comprising:

at least one of the coil ~~(108, 118, 128, 138, 168, 178)~~, the magnet ~~(104, 134, 144, 154, 164, 174)~~ and the housing ~~(102, 132, 162, 172)~~ being nonuniform in orientation relative to the armature ~~(106, 136, 166, 176)~~,

whereby displacement of the armature ~~(106, 136, 166, 176)~~ relative to the housing ~~(102, 132, 162, 172)~~ will be substantially linearly proportional to electrical current flowing through the coil ~~(108, 118, 128, 138, 168, 178)~~.

2. The voice coil ~~(108, 118, 128, 138, 168, 178)~~ actuator according to claim 1, wherein the movement of the armature ~~(106, 136, 166, 176)~~ relative to the housing ~~(102, 132, 162, 172)~~ is radial in nature.

3. The voice coil actuator ~~(100, 130, 160, 170)~~ according to claim 1, wherein the movement of the armature ~~(106, 136, 166, 176)~~ relative to the housing ~~(102, 132, 162, 172)~~ is axial in nature.

4. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-3~~claim 1, wherein the coil ~~(108, 118, 128, 138, 168, 178)~~ is carried by the armature ~~(106, 136, 166, 176)~~.

5. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-3~~claim 1, wherein the magnet ~~(104, 134, 144, 154, 164, 174)~~ is carried by the armature ~~(106, 136, 166, 176)~~.

6. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-5~~claim 1, wherein the coil ~~(108, 118, 128, 138, 168, 178)~~ is a single winding.

7. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-6~~claim 1, wherein the coil ~~(108, 118, 128, 138, 168, 178)~~ is tapered.

8. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-7~~claim 1, wherein the housing ~~(102, 132, 162, 172)~~ is tapered.

9. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-8~~claim 1, wherein the magnet ~~(104, 134, 144, 154, 164, 174)~~ is nonuniform.

10. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-4~~claim 1, wherein the magnet ~~(104, 134, 144, 154, 164, 174)~~ is in the housing ~~(102, 132, 162, 172)~~.

11. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-4 and 10~~claim 1, wherein the magnet ~~(104, 134, 144, 154, 164, 174)~~ is radially contained in the housing ~~(102, 132, 162, 172)~~.

12. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-11~~claim 1, wherein the coil ~~(108, 118, 128, 138, 168, 178)~~ is linearly tapered.

13. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-11~~claim 1, wherein the coil ~~(108, 118, 128, 138, 168, 178)~~ is parabolically tapered.

14. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-11~~claim1, wherein the coil ~~(108, 118, 128, 138, 168, 178)~~ is arcuately tapered.

15. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-11~~claim 1, wherein the coil ~~(108, 118, 128, 138, 168, 178)~~ is discontinuously tapered.

16. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-15~~claim 1, wherein the magnet ~~(104, 134, 144, 154, 164, 174)~~ is arcuately tapered.

17. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-15~~claim 1, wherein the magnet ~~(104, 134, 144, 154, 164, 174)~~ is discontinuously tapered.

18. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-15~~claim 1, wherein the magnet ~~(104, 134, 144, 154, 164, 174)~~ is parabolically tapered.

19. The voice coil actuator ~~(100, 130, 160, 170)~~ according to ~~any of claims 1-15~~claim 1, wherein the magnet ~~(104, 134, 144, 154, 164, 174)~~ is linearly tapered.